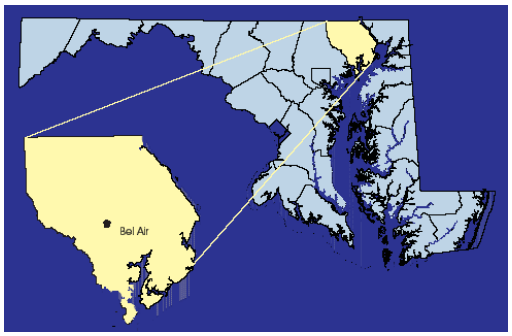
8.15 HARFORD COUNTY



This chapter presents information about stream conditions of potential management interest in Harford County based on the 2000-2004 Maryland Biological Stream Survey (MBSS) results. Information from MBSS data collected between 1994 and 1997 can be found in MDNR 2001m.

8.15.1 Ecological Health

Based on the three ecological health indicators used by the MBSS, the overall condition of Harford County streams during 2000-2004 was Fair (Figure 8-114). The FIBI results indicate that 39% of the streams in the county were in Good condition, while 42% rated Good using the BIBI. In contrast, 41% of the streams in the county scored as Poor or Very Poor using the CBI, while 26% scored as Good and 34% scored as Fair.

There did not appear to be a strong geographic trend in IBI scores within the county, and fish and benthic IBIs at a site often differed by one rating category. However, few sites rated Good for either fish or benthos south of I-95, and sites where both fish and benthos rated Good were primarily in the upper portion of the Deer Creek watershed. The highest rated stream in Harford County using the Combined Biotic Index (CBI) was Deer Creek and several of its unnamed tributaries, while the lowest rated streams included the Middle Branch of Romney Creek, as well as unnamed tributaries to the Bush River and Deer Creek (Table 8-29). Based on Stream Waders volunteer data, many sites were rated Good for benthic macroinvertebrates in the Deer Creek watershed, while all samples collected on Aberdeen Proving Ground were rated as Very Poor (Table 8-30).

8.15.2 Physical Habitat

8.15.2.1 Overall Condition

Based on the Physical Habitat Index (PHI), 12% of the streams in Harford County had Good habitat, 47% had Partially Degraded habitat, and 40% had Poor or Very Poor habitat (Figure 8-115). Sites with Degraded and Severely Degraded physical habitat were mostly located in the eastern half of the county. In contrast, most of the sites rated as having Minimally Degraded physical habitat were located in the Deer Creek watershed.

8.15.2.2 Trash

Nearly 32% of the stream miles in Harford County were rated Optimal for trash (Figure 8-116). In contrast, 20% of streams were rated as being in Marginal or Poor condition. There was no strong geographic trend in high trash areas. However, sites were generally scored higher in the northwest part of the county and the Aberdeen Proving Ground than other parts of Harford County.

8.15.2.3 Channelization

About 19% of the stream miles in Harford County were channelized (Table 8-4). Rip-rap, culvert pipes, earthen ditches and concrete were the types of documented channelization (Figure 8-117). Ditches were most common in the southern part of the county, including Aberdeen Proving Ground, while sites with rip-rap were all located in the center of the county. No other geographic trends were evident.

8.15.2.4 Inadequate Riparian Buffer

Nearly 6% of the stream miles in Harford County had no riparian buffers during the 2000-2004 MBSS (Table 8-3). In addition, 7% of stream miles had severe breaks in existing riparian buffers. Sites with inadequate riparian buffers during the 2000-2004 MBSS tended to be located in the northwestern part of the county (Figure 8-118). However, sites with severe breaks in the riparian buffer zone were more uniformly distributed around the county. Examples of riparian buffer breaks included direct entry of road runoff into streams, eroded gullies that comprise buffer integrity, and direct access of livestock to streams. Additional information about buffer breaks, analyzed by county, is provided in: 2000-2004 Maryland Biological Stream Survey Volume 10: Riparian Zone Conditions (http:www/dnr/Maryland.gov/streams/pubs/ea05-7_ riparian.pdf).

8.15.2.5 Eroded Banks/Bedload Movement

Slightly over one half of the stream miles in Harford County had minimal (Optimal) bank erosion (Figure 8-119). Only 4% of streams had bank erosion that was rated as Poor, and 10% of stream miles were rated as Marginal. In general, lesser amounts of bank erosion were evident in the northern part of the county and within Aberdeen Proving Ground.

Over 83% of the stream miles in Harford County had only minor bar formation or were devoid of bars (Figure 8-119). An estimated 5% of stream miles had extensive bar formation, and 11% of streams were rated as having moderate bar formation. Bar formation appeared to be more pronounced in lower Deer Creek and in the area around Edgewood, Maryland.

8.15.3 Key Nutrients

8.15.3.1 Nitrate-Nitrogen

Nearly 30% of the stream miles in Harford County had nitrate-nitrogen levels below the threshold for forested streams (Figure 8-120). Of the remaining 70% of stream miles, 8% had values greater than 5 mg/l, a level at which biological effects have been documented. The highest nitrate-nitrogen levels were evident in the northwestern part of the county, while levels were low at all sites on Aberdeen Proving Ground and generally lower in the southeastern portion of the county.

8.15.3.2 Total Phosphorus

In contrast to nitrate-nitrogen, most stream miles in Harford County had total phosphorus levels below the threshold for forested streams in Maryland (Figure 8-121). Nearly 66% of stream miles fell into this category, while only 7% of streams had levels above those associated with biological effects. Two areas of Harford County had high levels of total phosphorus; the northwestern border with Baltimore County and the northeastern corner of Aberdeen Proving Ground. There was also a single site just south of Edgewood that had high phosphorus levels.

8.15.4 Stream and River Biodiversity

To provide a means to prioritize stream systems for biodiversity protection and restoration within each county and on a statewide basis, a tiered watershed and stream reach prioritization method was developed. Special emphasis was placed on state-listed species, stronghold watersheds for state-listed species, and stream reaches with one or more state-listed aquatic fauna. Fauna considered included stream salamanders, freshwater fishes, and freshwater mussels. Rare, pollution-sensitive benthic macroinvertebrates collected during the 1994-2004 MBSS were also used to identify the suite of watersheds necessary to conserve the full array of known stream and river biota in Maryland. A complete description of the bio-diversity ranking process is found in: 2000-2004 Maryland Biological Stream Survey Volume 9: Stream and Riverine Biodiversity (http:www/dnr/Maryland.gov/streams/pubs/ea05-6_biodiv.pdf).

Of the nine watersheds found in Harford County, Deer Creek and Broad Creek were classified as Tier 1, meaning that these watersheds serve as strongholds for one or more state listed aquatic species (Figure 8-122). It is also noteworthy that Deer Creek is among the top four watersheds in Maryland in terms of stream and river biodiversity ranking. The Lower Susquehanna River/Octoraro Creek/Conowingo Dam Susquehanna River watershed was classified as a Tier 2 watershed, meaning that it serves as a stronghold for one or more non-state listed species of Greatest Conservation Need (GCN), and has state-listed aquatic fauna present. In stark contrast, the Gunpowder River/Lower Gunpowder Falls/Bird River/Middle River watershed was among the lowest ranking for stream and river biodiversity in the state (75th of 84). Any reaches that had either state-listed or GCN species, or high intactness values were highlighted to facilitate additional emphasis in planning restoration and protection activities.

8.15.5 Stressors

At 98% of stream miles, the most extensive stressor characterized by the MBSS in Harford County during the 2000-2004 MBSS was non-native terrestrial plants in the riparian zone (Figure 8-5). Other stressors found were: streams with non-native aquatic fauna (55% of stream miles); eroded banks (21% of stream miles); streams with >5% upstream urban land use (observed in 31% of stream miles); high nitrate-nitrogen levels (8% of stream miles);

AN IMPORTANT NOTE ON BIODIVERSITY MANAGEMENT

Perhaps the largest ongoing natural resources restoration and protection effort in Maryland is associated with the Chesapeake Bay. In most cases, freshwater biodiversity is not specifically considered during placement and prioritization of Bay restoration and protection projects. In this report and in the more detailed volume in the series on aquatic biodiversity, a system of biodiversity ranking is presented to provide counties and other stewards with a means to plan appropriate protection and restoration activities in locations where they would most benefit stream and river species. Given the historically low level of funding for biodiversity protection and restoration in Maryland and elsewhere, the potential benefit of incorporating freshwater biodiversity needs into other efforts is quite large.

However, it is important to note that although freshwater taxa are the most imperiled group of organisms in Maryland, other groups and individual species not typically found in freshwater habitats are also at high risk and constitute high priority targets for conservation. In addition, freshwater taxa that prefer habitats such as small wetlands may not be well-characterized by the ranking system employed here. To conserve the full array of Maryland's flora and fauna, it is clearly necessary to use other, landscape-based tools and consider factors such as maintaining or reconnecting terrestrial travel corridors.

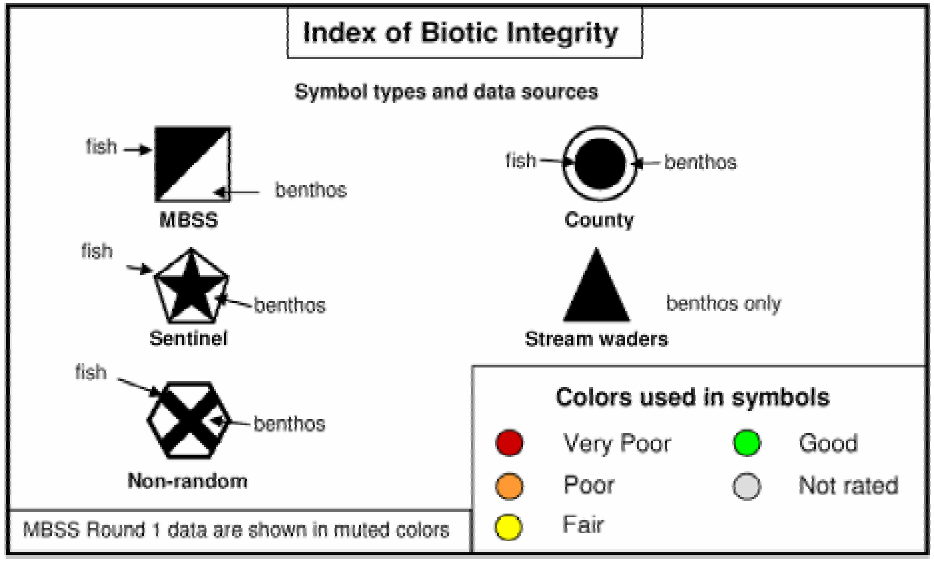
streams without riparian buffers (6%); acid deposition (7%); channelized streams (6% of stream miles); and low dissolved oxygen (4% of stream miles).

The Harford County Department of Public Works (DPW) conducts various monitoring and assessment programs to meet the requirements of its National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Discharge Permit as well as to support restoration efforts in the county.

DPW has an ongoing effort to assess each of the County's ten designated watersheds to determine the environmental health of the watershed and to identify areas of concern. A field reconnaissance is performed on each stream mile utilizing DNR's Stream Corridor Assessment (SCA) methodologies. The survey records information on problem areas such as fish barriers, eroded streambanks, exposed pipes and inadequate buffers. The problem areas are photographed, evaluated and scored to determine the severity, correctibility and accessibility of the problem. Survey results are used as a tool for government agencies, local organizations and private landowners to identify and implement water quality and restoration projects within the watersheds.

The County contributes to Maryland's understanding of stormwater runoff and its effect on water resources by conducting monitoring efforts on a tributary to Winters Run. The efforts consist of characterizing stormwater discharges from a residential outfall and an associated in-stream station using chemical, biological and physical monitoring techniques. Other assessment efforts within Harford County include preparation of Watershed Restoration Action Strategies (WRASs) for the Bush River watershed, in collaboration with Maryland DNR, the Center for Watershed Protection, and various state and federal agencies. Published results of this effort include a Bush River Watershed Characterization, a Nutrient and Biotic Synoptic Survey Report and a Bush River Watershed Management Plan (www.dnr.state.md.us/watersheds/surf/proj/wras.html). As a result of the WRAS process, DNR and the County have continued chemical and biological monitoring at selected tributaries within watershed and have established a real-time, shallow water monitoring effort in the Bush River (www.eyesonthebay.net). The County's Department of Planning and Zoning is currently developing a WRAS for the Deer Creek Watershed. The County has also been cooperating with the U.S. Geological Survey (USGS) on the operation of continuous-record stream flow gaging stations on James Run, Plumtree Run and Bynum Run, along with establishing a baseline water quality monitoring program at two of these locations (http://md.water.usgs.gov).

Key to MBSS 2000-2004 County Maps



Tier 1: Stronghold watershed (most robust remaining population) for one or more state-listed fish, aquatic herpetofauna, or freshwater mussels.

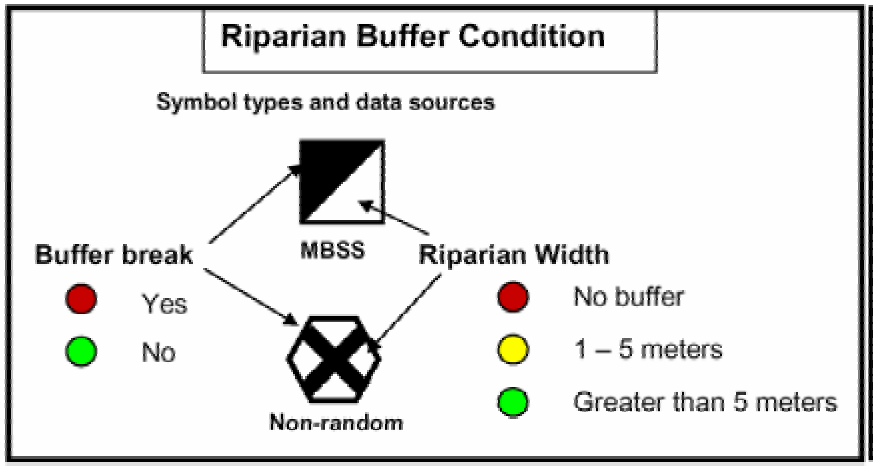
Tier 2: Stronghold watershed for one or more non-state listed species of greatest conservation need (GCN) fish, aquatic herpetofauna, or freshwater mussels, that also had state-listed fish, aquatic herpetofauna, or freshwater mussels present.

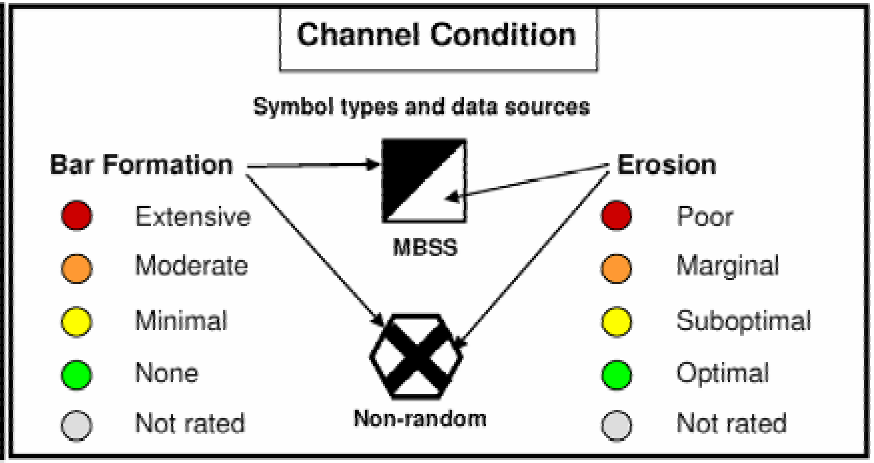
Tier 3: Stronghold watershed for one or more non-state listed GCN fish, aquatic herpetofauna, or freshwater mussels, no state-listed fish, aquatic herpetofauna, or freshwater mussels present.

Tier 4: Non-stronghold watershed with one or more state-listed fish, aquatic herpetofauna, or freshwater mussels present.

Tier 5: Not of the above, but a biodiversity conservation watershed. In other words, part of the network of watersheds that must be conserved to keep all native fishes, aquatic herpetofauna, freshwater mussels, and rare, pollution sensitive benthic macroinvertebrates extant in Maryland.

Tier 6: Not of the above.





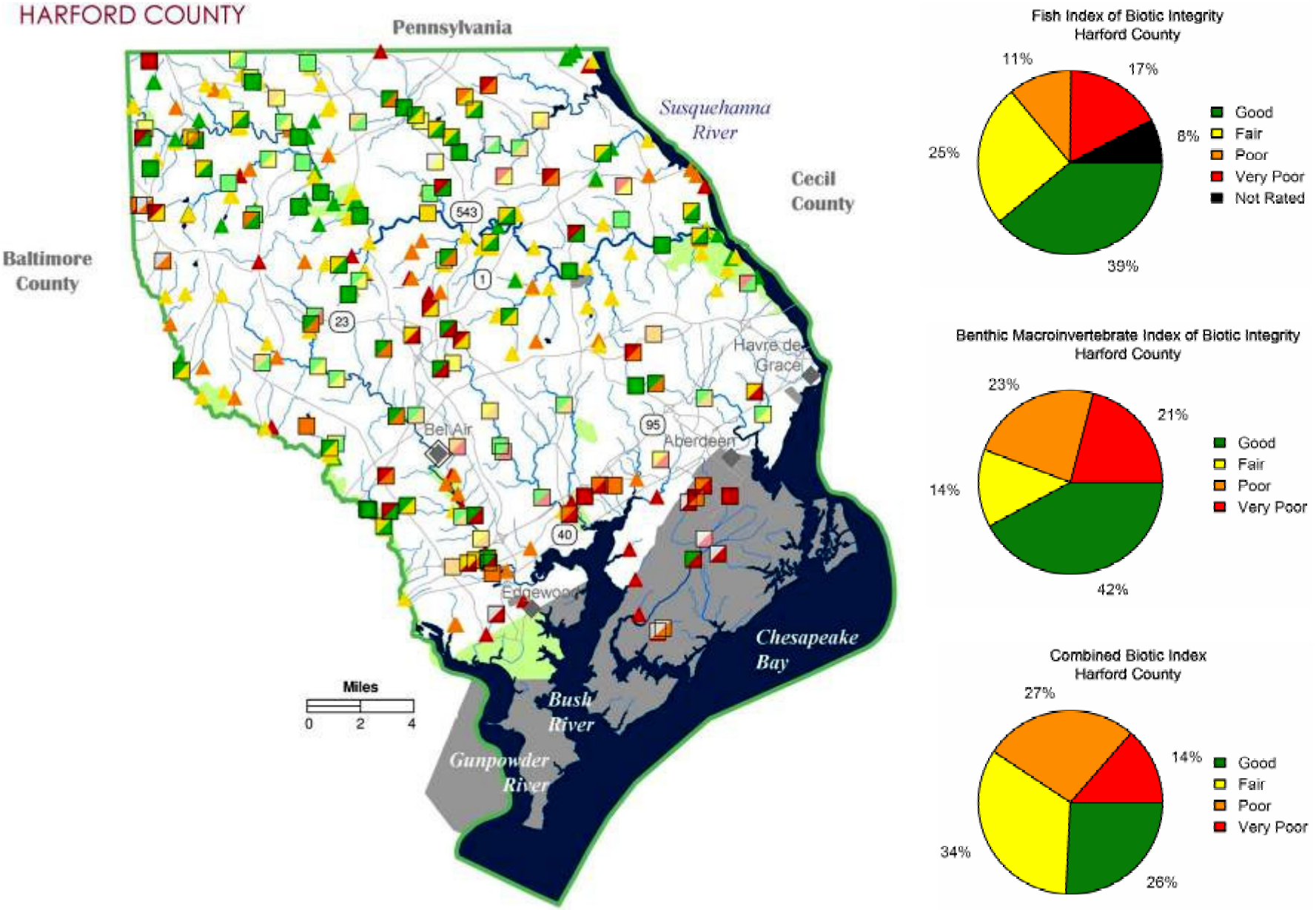


Figure 8-114. Benthic Index of Biotic Integrity (BIBI) and Fish Index of Biotic Integrity (FIBI) pie charts and map of stream health for Harford County streams sampled by the MBSS during 1995-97 and 2000-2004 (pie charts represent 2000-2004 data only, Combined Biotic Index pie chart represents mean of FIBI and BIBI)

Table 8-29. MBSS sites sampled in Harford County during 1994- 2004, ranked by Combined Biotic Index Score (CBI)

Harford County - MBSS Sites

SITE NUMBER	STREAM NAME	WATERSHED	CBI
Best (in order of CBI score)			
HA-P-156-112-97	Deer Creek UT	Deer Creek	4.67
DEER-302-R-2001	Deer Creek	Deer Creek	4.67
DEER-101-R-2001	Deer Creek UT5	Deer Creek	4.67
DEER-207-R-2001	Big Branch	Deer Creek	4.50
HA-P-100-204-97	Deer Creek	Deer Creek	4.50
DEER-113-R-2001	Wet Stone Branch	Deer Creek	4.50
DEER-126-R-2004	Wet Stone Branch	Deer Creek	4.50
DEER-303-R-2004	Deer Creek	Deer Creek	4.33
HA-P-214-211-97	Holland Branch	Deer Creek	4.33
HA-P-012-205-97	Mine Branch	Deer Creek	4.33
SWAN-104-R-2000	Carsins Run	Swan Creek	4.33
BROA-306-R-2003	Broad Creek	Broad Creek	4.33
HA-P-071-318-97	Broad Creek	Broad Creek	4.33
DEER-408-R-2001	Deer Creek	Deer Creek	4.33
LIGU-306-R-2001	Little Gunpowder Falls	Little Gunpowder Falls	4.33
HA-P-178-209-97	Big Branch	Deer Creek	4.17
LIGU-312-R-2001	Little Gunpowder Falls	Little Gunpowder Falls	4.17
LIGU-303-R-2003	Little Gunpowder Falls	Little Gunpowder Falls	4.17
HA-P-010-103-97	South Stirrup Run	Deer Creek	4.17
HA-P-033-203-97	Little Deer Creek	Deer Creek	4.17
LWIN-104-R-2004	Mountain Branch	Winters Run Lower	4.17
DEER-123-R-2004	Island Branch	Deer Creek	4.17
HA-P-180-107-97	Falling Branch	Deer Creek	4.17
DEER-109-R-2001	Buck Branch	Deer Creek	4.17
DEER-112-R-2001	Deer Creek UT1	Deer Creek	4.17

SITE NUMBER	STREAM NAME	WATERSHED	CBI
Worst (most degraded sites first)			
HA-N-003-204-96	Romney Creek Middle Branch	Aberdeen Proving Grounds	1.00
DEER-107-R-2004	Deer Creek UT6	Deer Creek	1.17
BUSH-106-R-2004	Bush River UT	Bush River	1.33
ABPG-103-R-2000	Romney Creek UT2	Aberdeen Proving Ground	1.43
BROA-101-R-2003	Deer Creek	Broad Creek	1.67
BUSH-101-R-2004	Church Creek UT1 Bush River	Bush River	1.67
ABPG-119-R-2000	Romney Creek UT1	Aberdeen Proving Ground	1.71
BROA-105-R-2003	Broad Creek UT6	Broad Creek	1.83
LIGU-104-R-2001	Wild Cat Branch UT1	Little Gunpowder Falls	1.83
HA-P-151-102-96	Plumtree Run	Atkisson Reservoir	1.83
SWAN-106-R-2000	Carsins Run	Swan Creek	1.83
ABPG-108-R-2000	Mosquito Creek	Aberdeen Proving Ground	1.86
ABPG-118-R-2000	Romney Creek UT1	Aberdeen Proving Ground	1.86
GUNP-104-R-2002	Reardon Inlet UT	Gunpowder River	1.86
ABPG-113-R-2000	Romney Creek UT1	Aberdeen Proving Ground	1.93
LIGU-111-R-2003	Little Gunpowder Falls UT4	Little Gunpowder Falls	2.00
LOCH-101-R-2002	Second Mine Branch	Loch Raven Reservoir	2.00
LOCH-111-R-2002	Second Mine Branch	Loch Raven Reservoir	2.00
BYNU-310-R-2004	Bynum Run	Bynum Run	2.17
BUSH-103-R-2004	Church Creek UT2 Bush River	Bush River	2.17
HA-P-099-102-97	Holland's Branch	Deer Creek	2.17
DEER-109-R-2004	Stout Bottle Branch	Deer Creek	2.17
HA-N-009-105-96	Unknown Stream	Winters Run Lower	2.17
LWIN-120-R-2004	Winters Run UT4	Winters Run Lower	2.17
HA-N-018-103-96	Swan Creek	Swan Creek	2.17

Table 8-30. Stream Waders sites sampled in Harford County during 2000-2004, ranked by Family-level Benthic Index of Biotic Integrity

Harford County - Stream Wader Sites				
WATERSHED	# GOOD	# FAIR	# POOR	# VERY POOR
Aberdeen Proving Ground	0	0	0	14
Atkisson Reservoir	0	2	6	2
Bush River	0	0	2	7
Bynum Run	0	1	0	0
Casselman River	0	2	0	0
Conowingo Dam Susq River	5	3	2	2
Deer Creek	33	66	19	6
Gunpowder River	0	0	2	1
Susquehanna River Lower	2	3	2	1
Little Gunpowder Falls	0	13	6	1
Lower Winters Run	0	2	1	2
Swan Creek	0	5	0	2

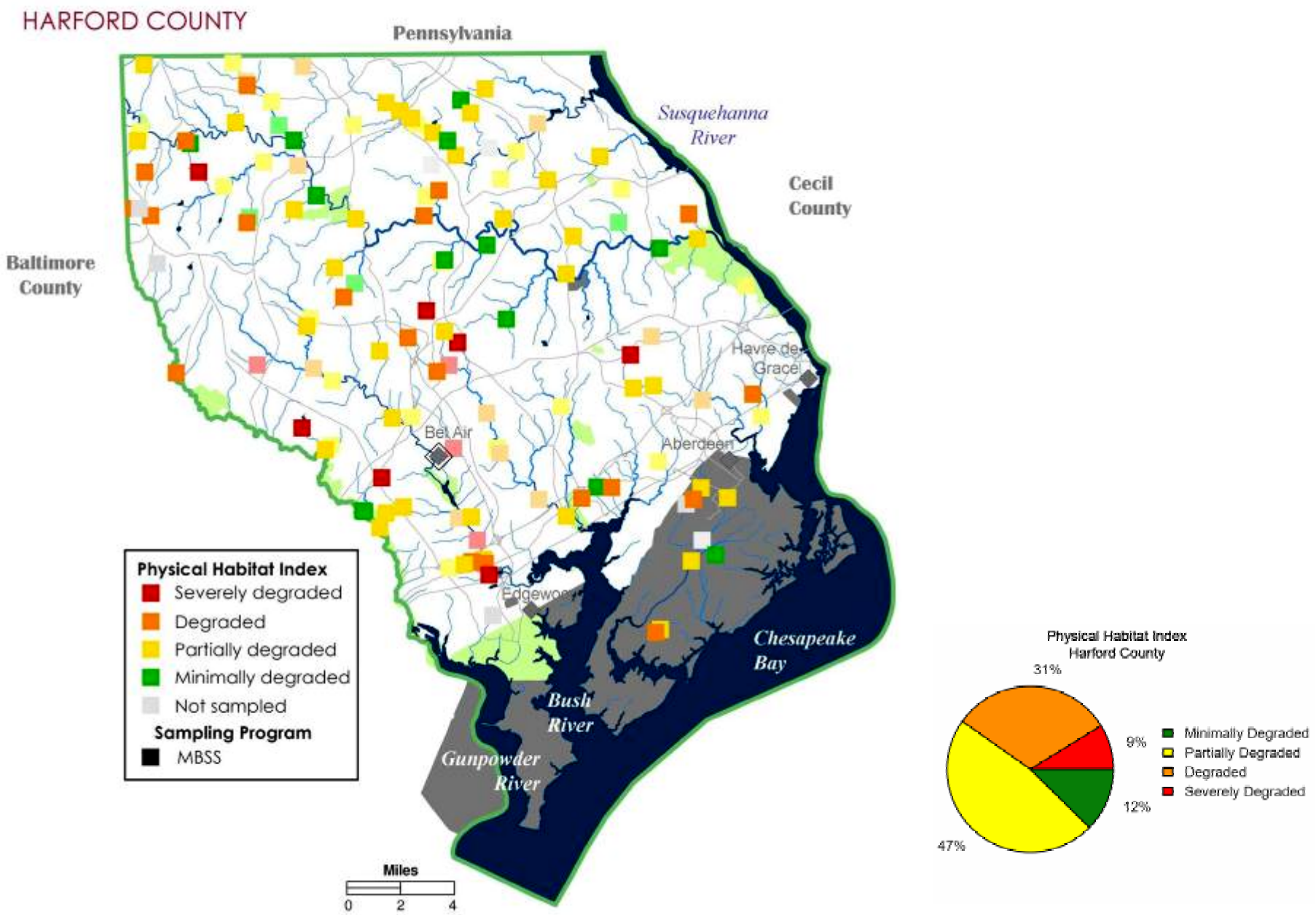


Figure 8-115. Physical Habitat Index (PHI) pie chart and map of stream habitat quality for Harford County streams sampled by the MBSS during 1995-97 and 2000-2004 (pie chart represents 2000-2004 data only)

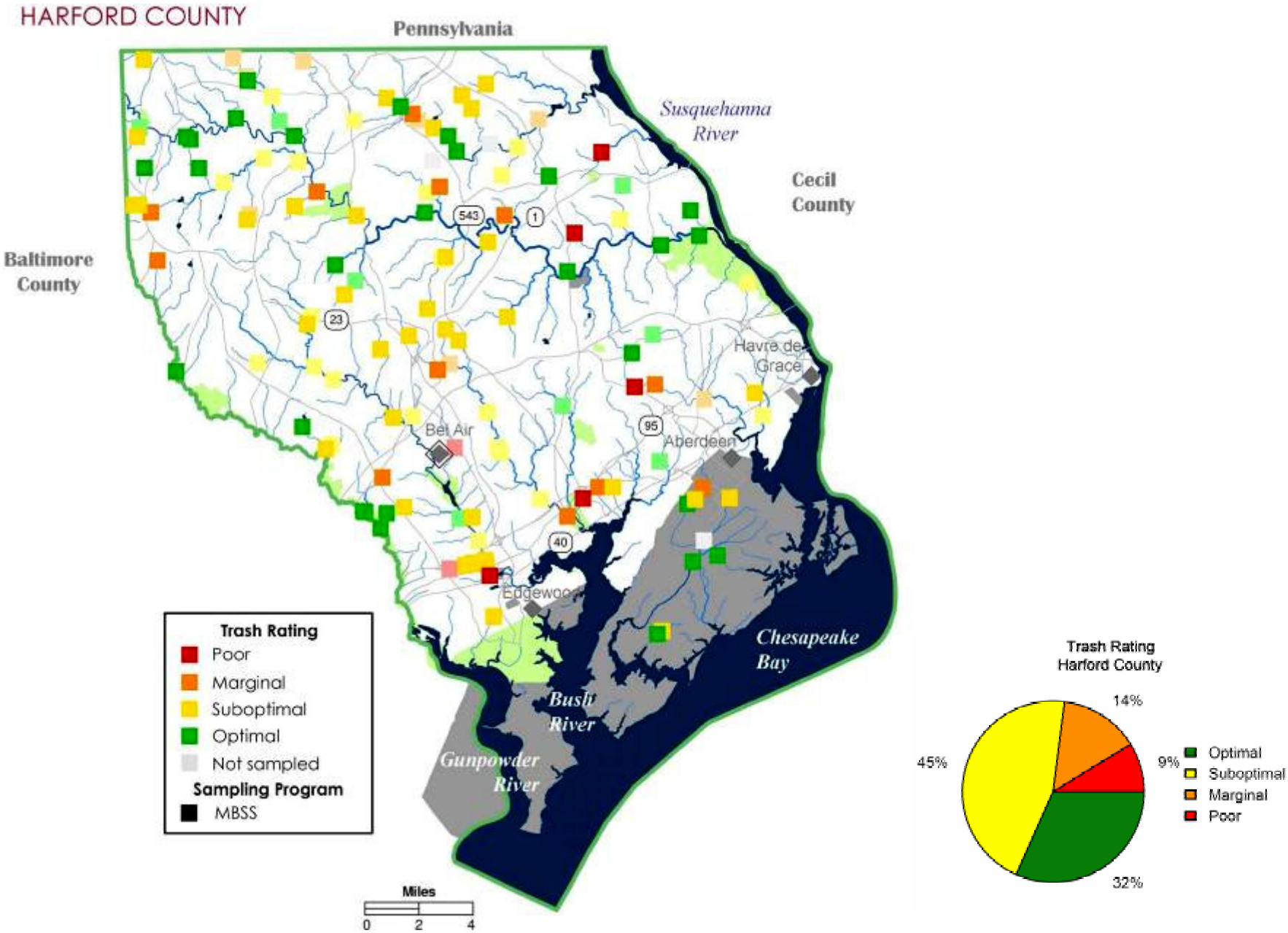


Figure 8-116. Pie chart and map of trash rating (0-20 scale) for Harford County streams sampled by the MBSS during 1995-97 and 2000-2004 (pie chart represents 2000-2004 data only)

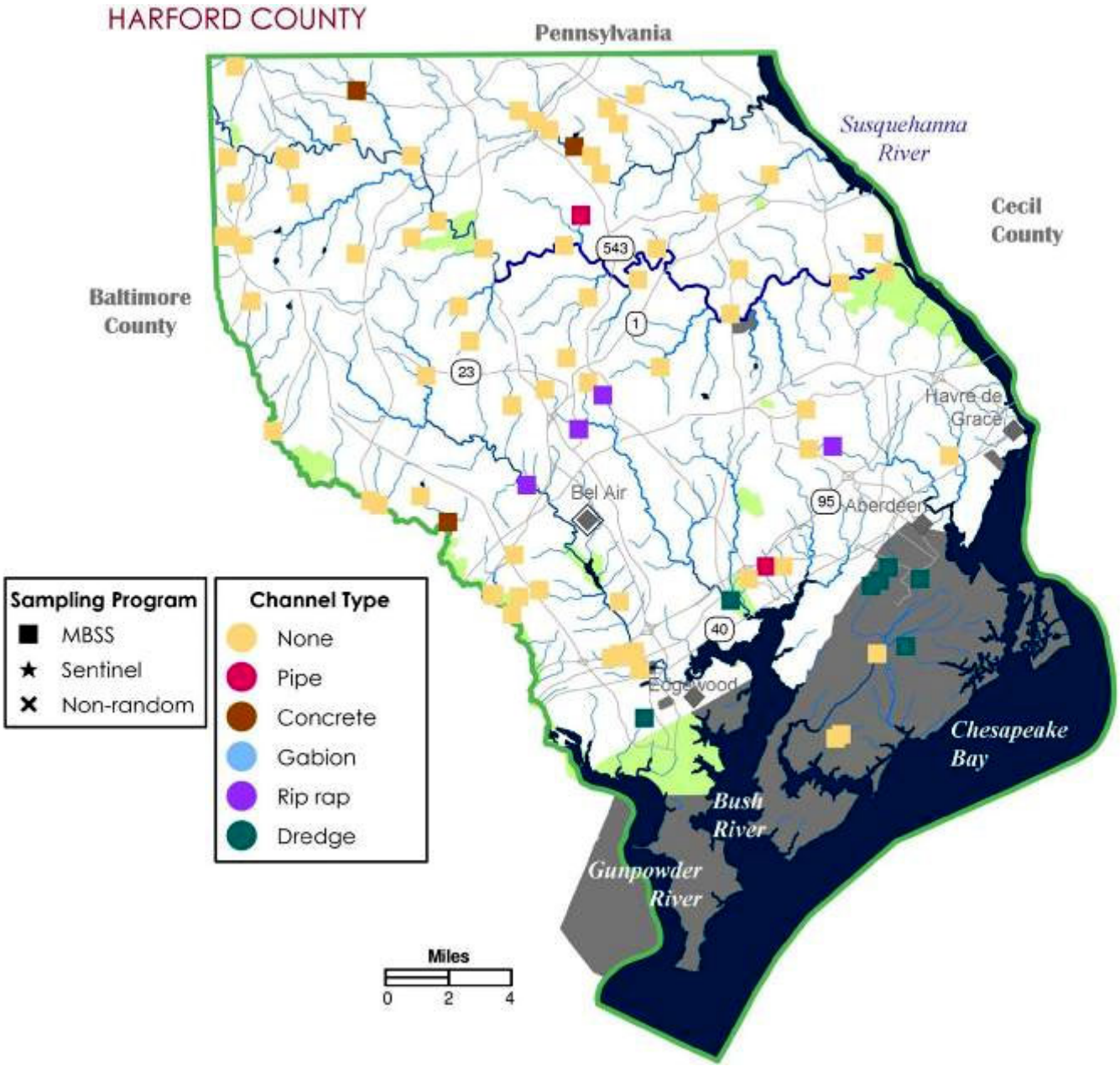


Figure 8-117. Map of channelized sites, by type, for Harford County streams sampled by the MBSS during 2000-2004. *NOTE: When channelization is indicated, it does not necessarily mean that the entire 75m segment was affected.*

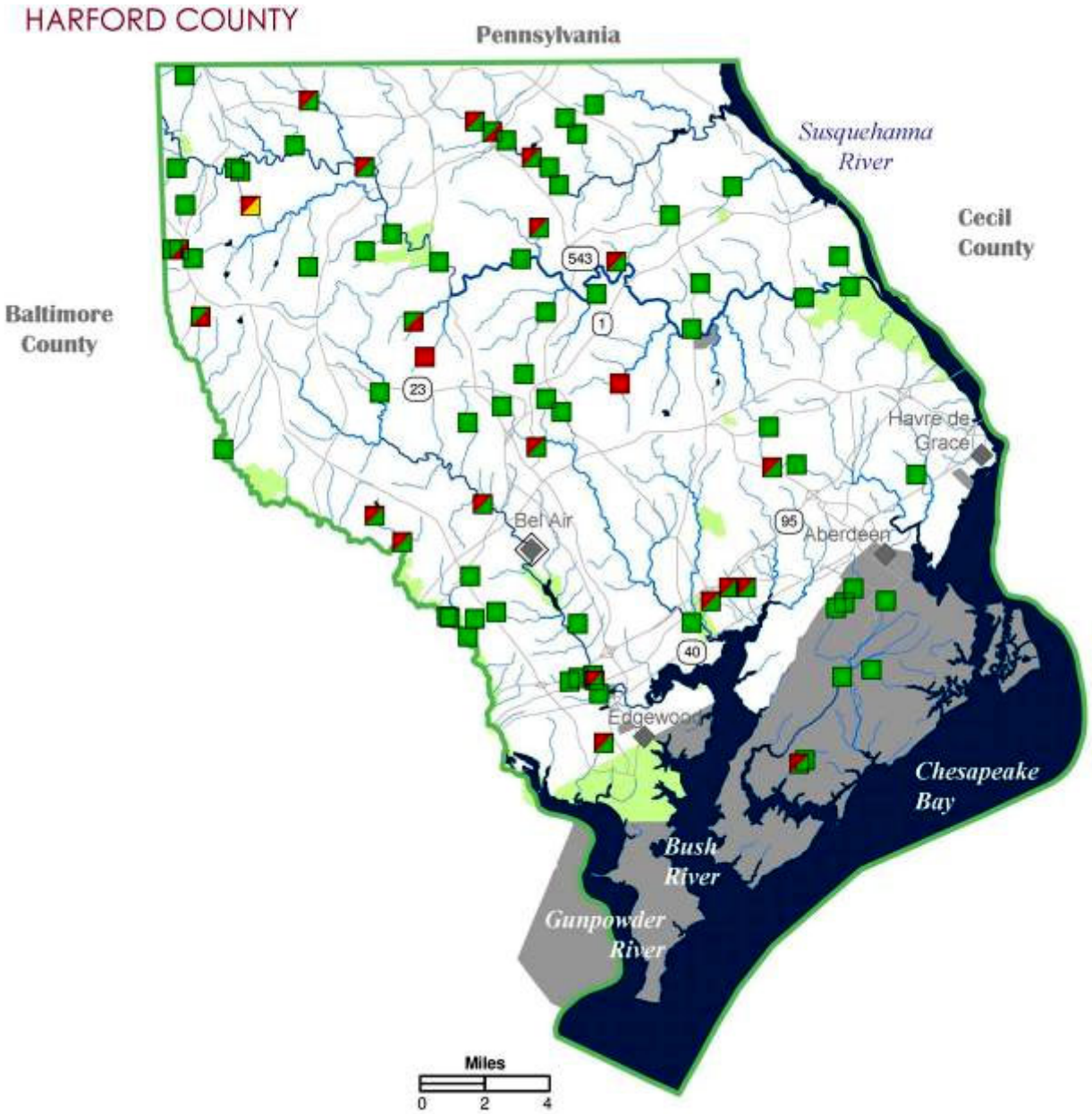


Figure 8-118. Map of sites with inadequate riparian buffers and buffer breaks for Harford County streams sampled by the MBSS during 2000-2004. *NOTE: Multiple riparian buffer breaks sometimes occurred at a site; only the most severe was depicted.*

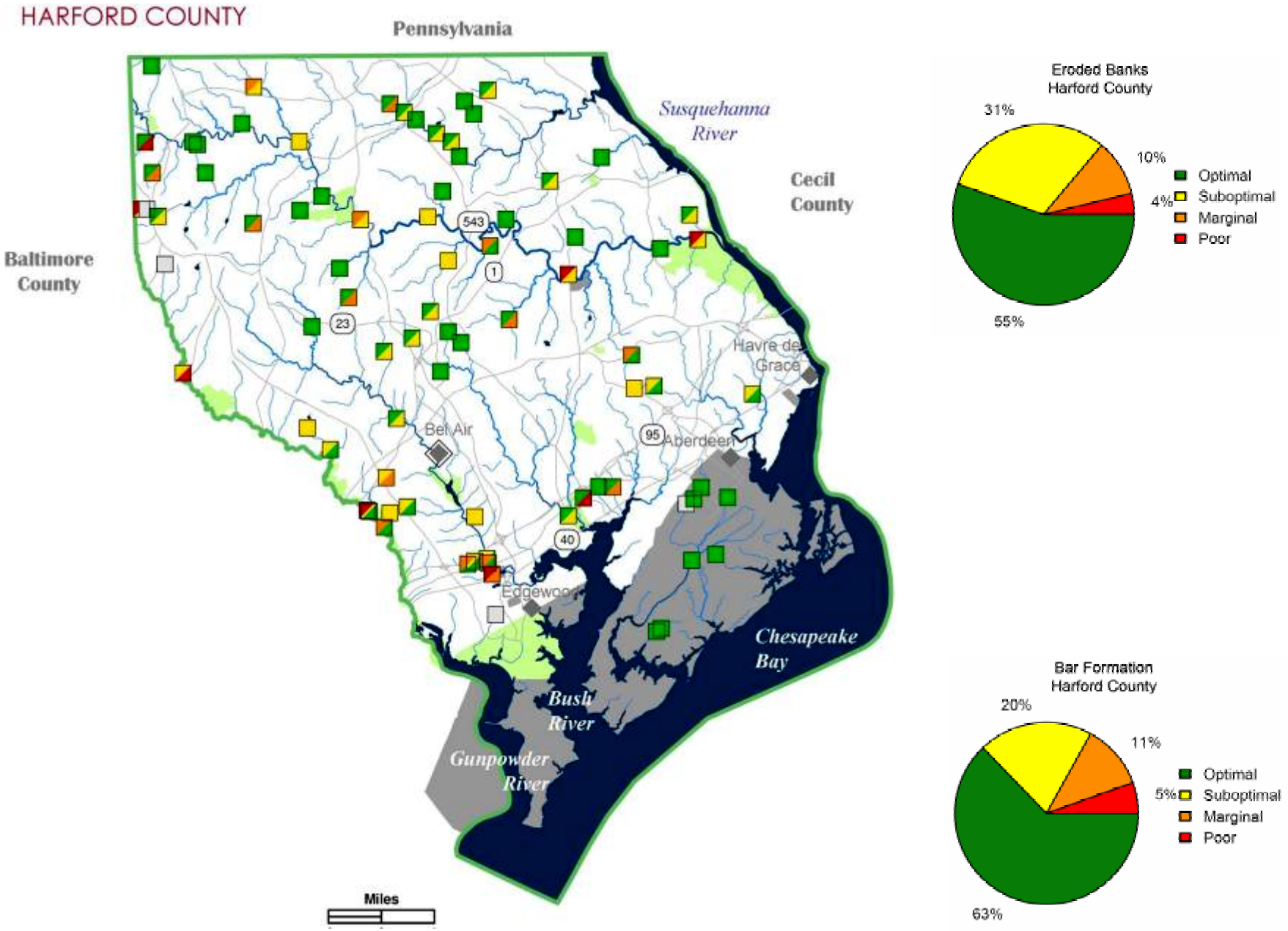


Figure 8-119. Pie charts and map of sites with eroded banks and instream bar formation for Harford County streams sampled by the MBSS during 2000-2004

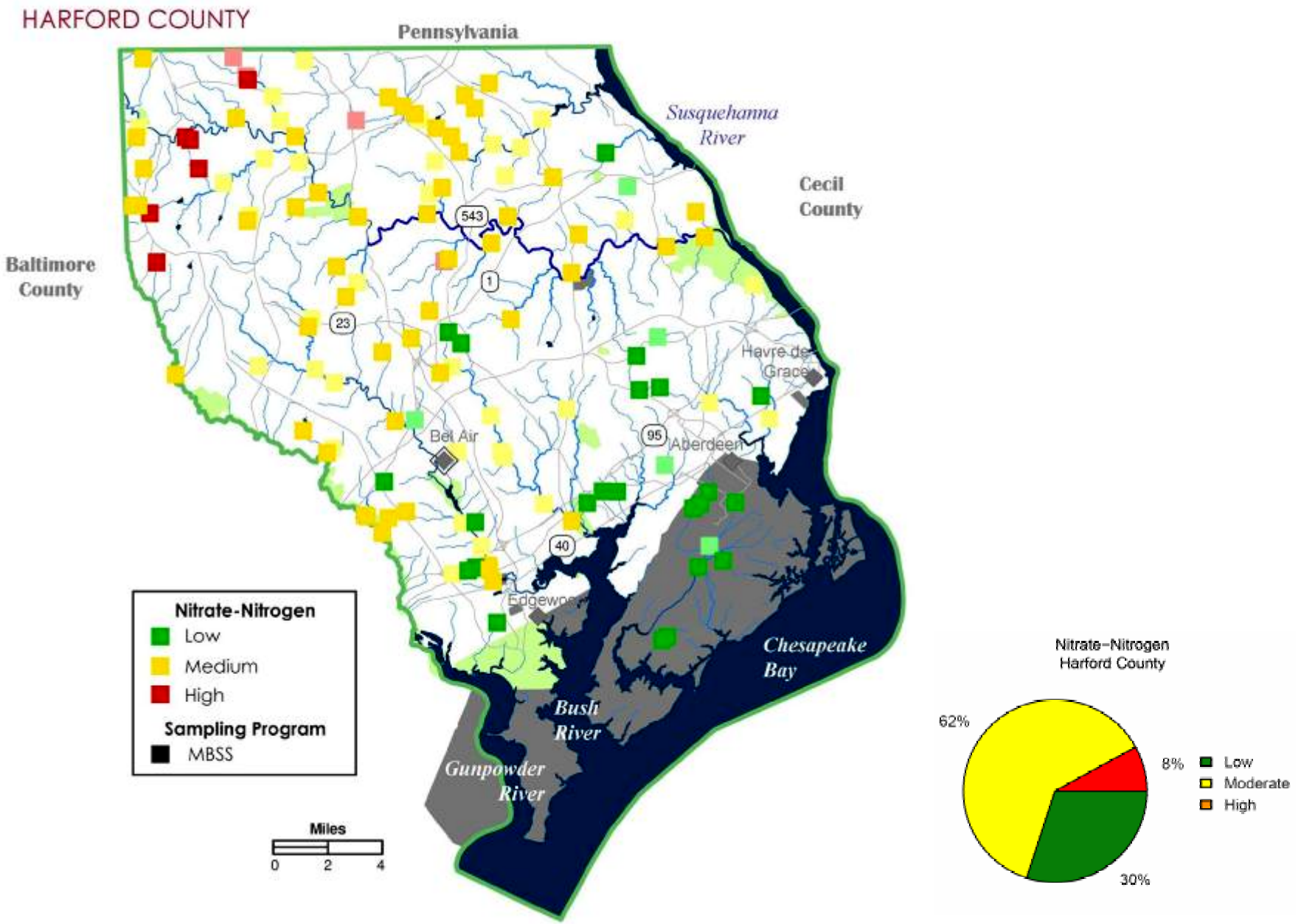


Figure 8-120. Pie chart and map of nitrate-nitrogen values (mg/l) for Harford County streams sampled by the MBSS during 1995-97 and 2000-2004 (pie chart represents 2000-2004 data only) (Low = 1.0, Medium = 1.0 – 5.0, High = > 5.0)

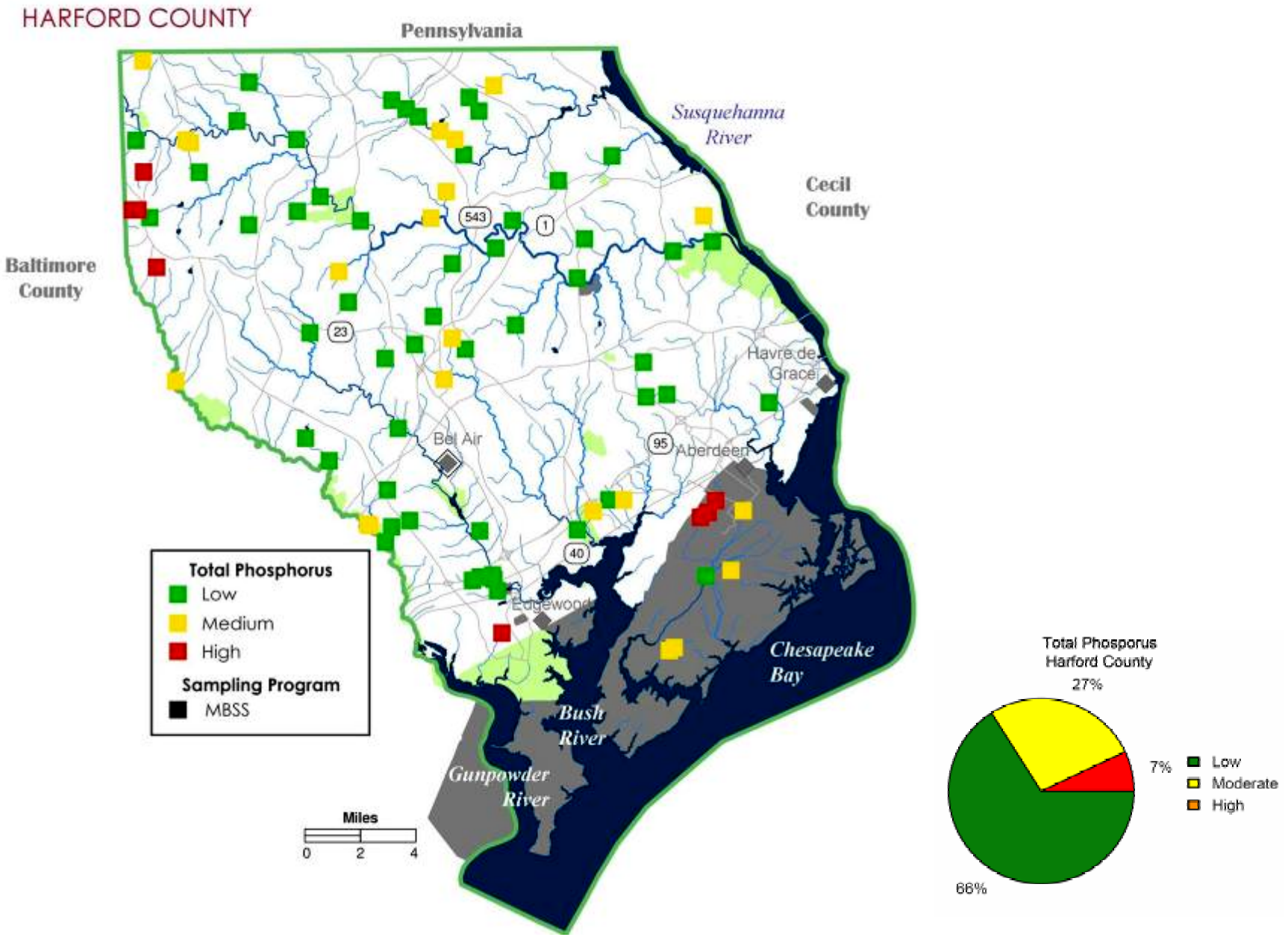


Figure 8-121. Pie chart and map of total phosphorus values (mg/l) for Harford County streams sampled by the MBSS during 2000-2004 (Low = < 0.025, Medium = 0.025 – 0.07, High = > 0.07)

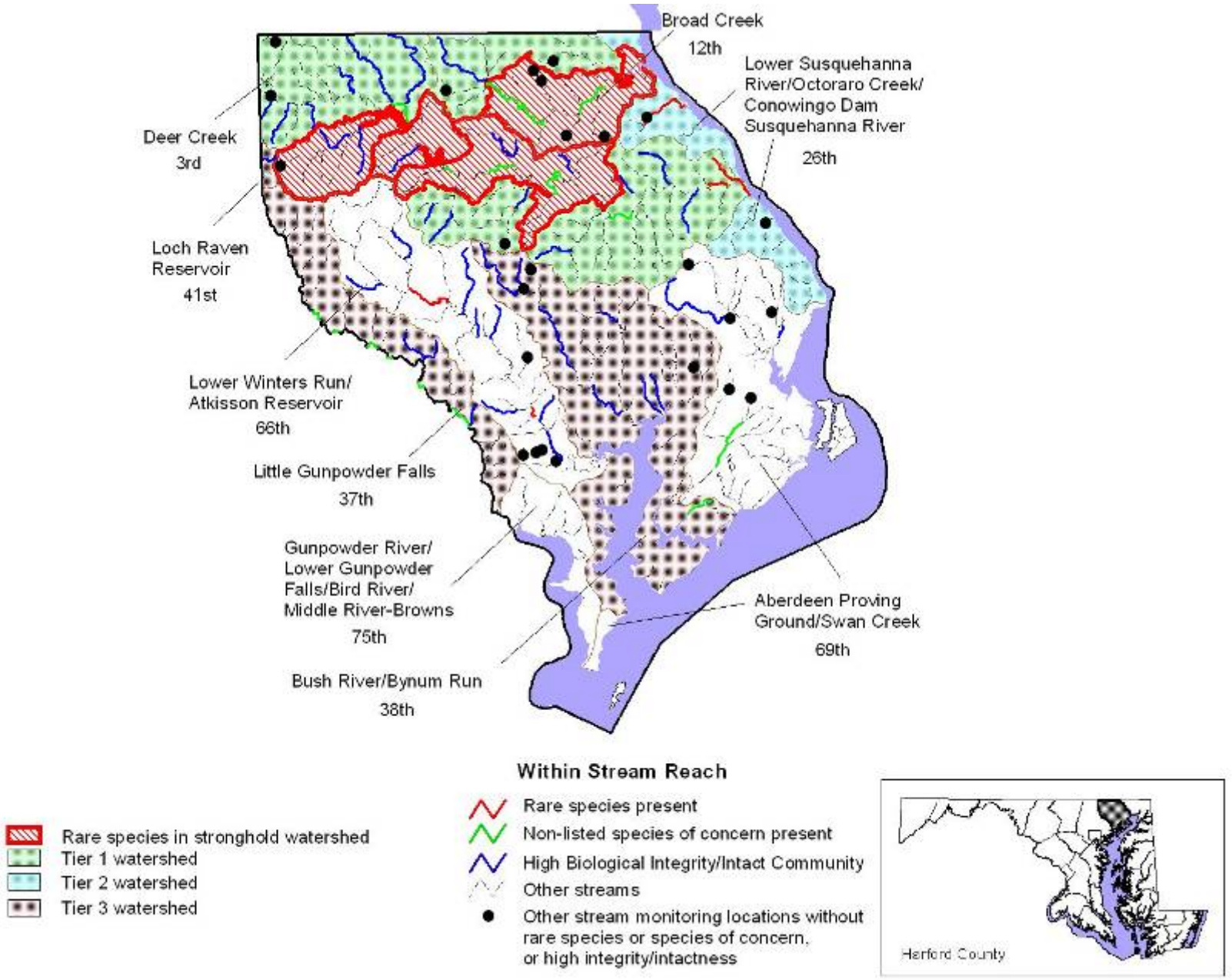


Figure 8-122. Aquatic Heritage Biodiversity Ranking map for Harford County, by watershed. Data from MBSS 1994-2004, MBSS qualitative data, Raesly, unpub. data, Harris 1975, Thompson 1984, and DNR Natural Heritage Program database.